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A tree of perfect codes

There are now more than 20, or perhaps 30, different constructions of perfect codes. The classification and enumeration of all perfect codes of length n is still an open problem, even for such small lengths as $n = 15$.

By considering tiles of Z_2^k, one may to any perfect 1-error correcting binary code C of length n recursively associate a tree. The root of the tree will be the perfect code C and all vertices will be perfect codes of shorter length than n. The leaves will be either linear perfect codes or full rank perfect codes. (A perfect code of length n has full rank if the dimension of the linear span of the words of the code will be equal to n.) This will show that full rank perfect codes act like prime elements and that the classification of full rank perfect codes is the key to the classification of all perfect 1-error correcting binary codes.

References

[1] O. Heden, *The partial order of perfect codes associated to a perfect code.* Advances in Mathematics of Communications, to appear.